Element 1
(e.g. sensor
or relay)

Element 2
(e.g. sensor
or relay)

Element 3
(e.g. sensor
or relay)

Element 1
controller

Element 2
controller

Element 3
controller

Network I/O
device
(speaks Modbus)

Network I/O
device
(speaks Modbus)

Network I/O
device
(speaks Modbus)

Ethernet

Programmable Logic
Controller

Process Control System 1

Fig. 1

Process Control
System 1

Process Control
System 2

Ethernet

Process Control
System 3

Fig. 2

Read all inputs. → Apply inputs for a rung of ladder. → Solve for output for the rung. → Solved for all rungs. → Write all outputs.

No

Start → Execute Ladder Logic. → Perform I/O serving. → Service PLC to PLC Commands. → Received STOP command? → Start
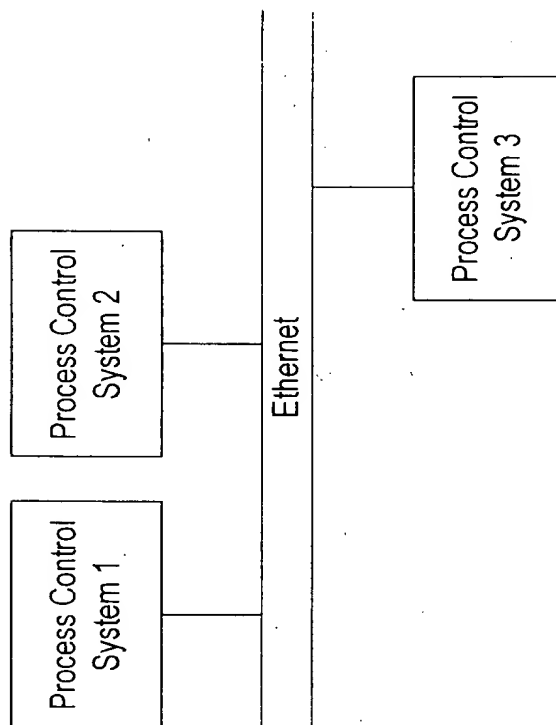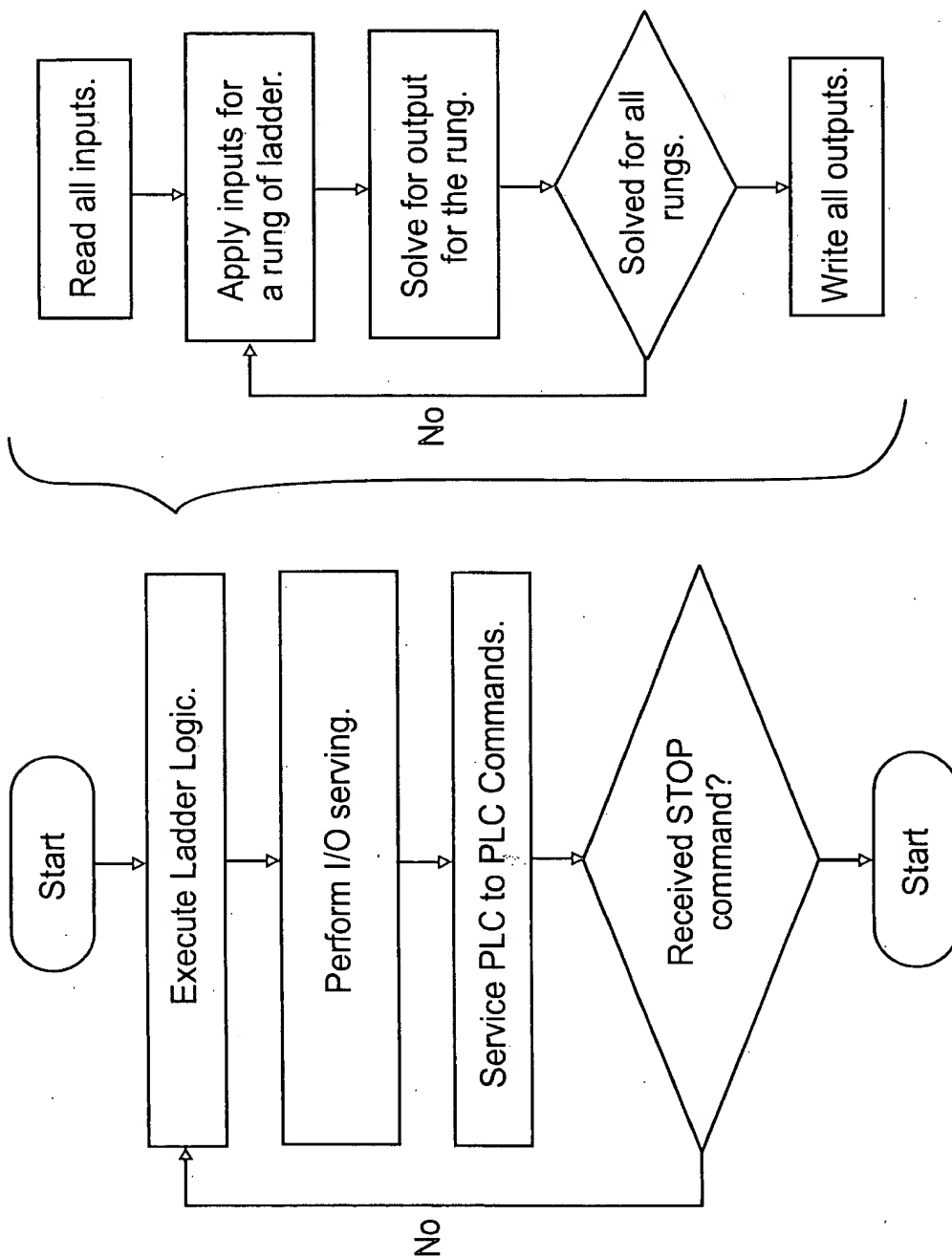
No

Fig. 3

Allow tuning of how long to wait for response to a query from a control or monitoring element, based on how long the element typically takes to respond.
Allow tuning of how often to query a control or monitoring element, based on the importance of having recent status information from the element.
Use a permanent-type network connection to a network I/O device for a control or monitoring element if the element is queried frequently enough.
Allow selecting of either of three Modbus protocols for a communication transaction: read register, write to register, or read and write to register of a network I/O device for a control or monitoring element.

Fig. 4